Space Weather Forecast

Issued on Saturday, 15 July 2023 at 01:11 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Minor/Moderate R1/R2 Blackouts likely throughout. Chance of G1/Minor Storms Day 1 (15 July). New CME awaiting analysis.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with a Moderate-class flare peaking at 14/0936UTC from a large region in the southwest. This flare produced a Coronal Mass Ejection (CME), but this has been assessed as not Earth directed. There are currently seven sunspot regions on the visible disc, with one region rotating off and another fading. The two most interesting regions on the disc are in the southwest and another in the northeast. Both are large regions with some magnetic complexity visible. Two further regions have recently rotated onto the east limb, but may not yet be fully visible. Another region is becoming more difficult to analyse as it starts to approach the west limb.

The Sun has been relatively prolific in producing CMEs in the period, however the event of most interest occurred with a Common-class flare peaking at 14/1844 UTC from the now faded region. This appeared to trigger an eruption. Solar imagery shows the eruption, from a position which is likely to be Earth directed, but we await coronagraph imagery for a full assessment.

Solar Wind / Geomagnetic Activity: The solar wind showed tailing weak CME effects at first, followed by a further CME arrival at 14/1525 UTC. The wind speed was initially slow, below 400 km/s, but jumped with the CME arrival and is varying between 400-450 km/s. The Interplanetary Magnetic Field was weak to moderate, but jumped as the CME arrived, peaking at strong levels. The north-south component was occasionally moderately southward directed for much of the period, becoming moderately northward directed after 14/1800 UTC. Geomagnetic activity was mostly Unsettled to Active, with a G1/Minor Storm interval 14/1800-2100 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is likely, with a slight chance of Strong flares. These are most likely from the two largest regions on the disc - one in the southwest and the other in the northeast.

Solar Wind / Geomagnetic Activity: Earth is currently experiencing weak CME effects. A further Earth directed CME is probable, but we await coronagraph imagery for a full assessment. The coronal hole forecast carries relatively high uncertainty. A small coronal hole is likely to connect imminently, however, the duration of the fast wind is likely to be short, and should ease through the course of the weekend. Confidence in the forecast beyond this is somewhat lower still as there may be a further diffuse equatorial coronal hole, but this is likely to have little effect at Earth.

Initially Unsettled to Active geomagnetic activity is expected, with a chance of further G1/Minor Storm intervals. Thereafter Quiet to Unsettled activity is expected, but with a likely increase at some point should the new CME mentioned above prove to be Earth directed.

Energetic Particles / Solar Radiation: No solar radiation storms are expected, but there is a slight chance of reaching the S1/Minor Storm threshold through the period, should any larger X-ray flares occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	5	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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